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ABSTRACT

The purpose of this study is to examine the effects of motivational teaching strategies and traditional teaching strategies on academic achievement and student attitudes toward mathematics. The sample consisted of 15 students from an adult high school who were seeking to pass the math Tennessee Competency Assessment Program exam. The students were taught one six-week unit using traditional strategies and one six-week unit using motivational strategies. Equivalent materials were used during both six-week periods. An attitude survey, publisher-created exams, and experimenter-created exams are used to collect data. The data from the exam scores and the survey were both analyzed using t-tests for paired samples. The results showed a significant difference in teaching strategies on academic achievement and in student attitudes toward mathematics. (Author)

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Running head: THE EFFECTS OF MOTIVATION ON AT RISK HIGH

The Effects of Motivation on At Risk High School Students in Math Performance

Patrick Kariuki

And

Paula Wilson

Milligan College

A Paper Presented at the Annual Conference
Of the Mid-South Educational Research Association
Chattanooga, Tennessee November 6-8, 2002

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Abstract

The purpose of this study was to examine the effects of motivational teaching strategies and traditional teaching strategies on academic achievement and student attitudes toward mathematics. The sample consisted of 15 students from an adult high school who were seeking to pass the math Tennessee Competency Assessment Program exam. The students were taught one six-week unit using traditional strategies and one six-week unit using motivational strategies. Equivalent materials were used during both six-week periods. An attitude survey, publisher-created exams, and experimenter-created exams were used to collect data. The data from the exam scores and the survey were both analyzed using t-tests for paired samples. The results showed a significant difference in teaching strategies on academic achievement and in student attitudes toward mathematics.

Review of Literature

Student motivation has been a growing concern among educators for many years. Acquiring student interest in academics has always been a concern, but more focus has been placed in the area of motivation within the past decade. The rate of students considered at risk of educational failure has been consistently increasing also, especially those at risk of failure in mathematics. Studies have shown that there is a strong correlation between lack of student motivation and the rising number of at risk students in math (Kasten & Howe, 1988; Thomas, 2000).

Lack of student motivation in mathematics has proven to be a problem in high schools across the United States for many years (Kloosterman, 1997). There are many students who are already motivated to learn. Unfortunately, the number of poorly motivated students is substantial and seems to be growing (Kloosterman, 1997). These are the students who fall into the at risk category and educators should choose alternative teaching strategies in order to prevent or at least reduce this rising number of students. Traditional methods of instruction continue to work well with most students, but at risk students often present challenges in the classroom which educators need to be prepared to counteract. Knowledge

and training of various motivational teaching methods is essential for an educator to be truly effective in teaching all students.

The term "at risk" can be defined in many different ways. Smith (2001) defines at risk students as those students who, because of various factors such as poverty or homelessness, are more likely to experience learning and behavior problems than other students. Although these students are normally fully included in educational programs, they have often been neglected in the classroom and consigned to failure (Smith, 2001). Many times, educators tend to prejudge or incorrectly label these students due to pre-existing factors such as poverty, homelessness, abusive parents, or single-parent homes, and to portray low expectations of them in the classroom. This, in turn, decreases the student's motivation to learn. It is almost critical for educators to realize the correlation between student motivation and performance in school. Much of the responsibility of motivation lies on the educator, not the student.

Motivation is defined as a force that drives students to learn, an internal state or condition that activates behavior and gives it direction (Fry, 1996). Although this definition remains consistent among studies, arguments continue to evolve proposing the question of how to assess student motivation and what elements must be included in order to

accurately assess motivation. Naccarato (1988) poses the question of whether it is possible to measure student motivation to learn as a single concept or if it is necessary to measure several different concepts and combine the information to determine a student's level of motivation. The term 'concept' refers to intrinsic motivation and extrinsic motivation. Intrinsic motivation is the internal drive to pursue a task simply for the sake of pursuing it; extrinsic motivation is inspired by outside influences such as anticipated rewards (Naccarato, 1988). Some students are already motivated to learn and have that initial internal drive to learn just for the sake of learning. However, many students need an outside influence or reward in order to encourage them to put forth more effort in the classroom. Unfortunately, these students tend to be the ones who are more at risk of educational failure.

Motivation does not mean posing threats and coercion in order to get the student to learn; it just means presenting a topic so that it is interesting and relevant to the student's life so that he wants to learn it (Withrow, 1990). The subject of mathematics is one that many students do not see as relevant. They want to know why they need to learn it and how it will be used in the future. Educators need to explain the relevance of the subject

and apply it to the student's every day life. This will help create an intrinsic motivation to learn. If a student feels that the subject content will be useful in the future, they are more willing to learn it.

Studies have shown that a student who is intrinsically motivated will retain information and concepts longer and is less likely to need remedial courses and review (Dev, 1997). Although any kind of motivation may seem preferable to none, a student with intrinsic motivation will fare better in the future because there may not always be an extrinsic reward to motivate them. Brewster and Fager, in their current work in motivation, suggest that efforts to promote student motivation need not be directed solely at students who have low levels of motivation (Brewster and Fager, 2000). Educators should create a classroom environment that attempts to motivate all students. One suggestion for promoting intrinsic motivation in the classroom is to evaluate student work as soon as possible and evaluate him or her based on the task, not in comparison to other students (Brewster & Fager, 2000). To ensure that intrinsic motivation is implemented in the classroom, extrinsic rewards should be used sparingly, if at all.

The first and most important step in assessing student motivation in the classroom is teacher observation and awareness. There are no

fool-proof instruments that educators can use to measure motivation (Kloosterman, 1997). Educators have to be observant and open-minded enough to realize that all students are not alike. Many different factors may affect a student's motivation to learn in any particular class. One factor may be the cultural background of the student. Some students are not able to see themselves and their background reflected in the curricula (Kasten & Howe, 1988). It is important for educators to be aware of cultural differences in students and to reflect those differences in the curriculum. Another factor may be anxiety toward a subject due to past failures. Many students have pre-conceived ideas of how they are going to succeed or fail in a course, especially in a mathematics course. Females in particular have tended to be especially at risk in many mathematics courses because math has frequently been viewed as a male domain (Kasten & Howe, 1988). Many females believe they just do not have the ability to succeed in math. Parents negative attitudes toward mathematics can also affect a student's mathematics education (Toliver, 1998). If parents had trouble in math when they were in school, they may convince their child that it is a genetic trait and he or she should not expect to do well in math, either. Most adults do not realize, however, how much they actually use math in

daily life and how important it is for their children to learn at least basic math concepts and the connections between school and life (Toliver, 1998) Other factors affecting student motivation to learn may include lack of emotional support from home. Some students may feel there is no use in exerting effort because no one really cares if they succeed or fail in school. Educators must have the knowledge and awareness to observe these factors in their students and build them into the curriculum.

One of the most available and least used sources of information educators can use to assess student motivation in the classroom is the students themselves (Litchfield, 1990). Many times, student perception and teacher perception of what motivates students may differ. The challenge is for teachers to discover which factors motivate students the most and implement them in the classroom (Litchfield, 1990). According to Withrow (1990), the key to motivation is communication. Educators often fail to simply ask their students what interests them. Students tend to be more willing to learn when they are involved in choosing curriculum content (Passe, 1996).

Many motivational strategies for teaching have been developed within the past decade due to the increase of knowledge about the relationship of motivation to learning (Alderman, 1985). Action learning is one of the most

popular and most effective strategies. The goal of action learning is to find ways to get the students involved in the learning process (Raffini, 1993). Students need challenges and stimulation in order to defeat boredom. Educators need to remember that if they are bored, so are the students. Varying instructional activities is another productive motivational strategy. Students are stimulated by teachers who are not always predictable or use limited instructional patterns (Raffini, 1993). Another powerful strategy found to motivate students today is Cooperative Learning, which is students working together. Students are motivated when they are active participants in learning and when they feel included. Research shows that technology can be useful in helping students to develop positive cooperative learning relationships. Teachers can draw on technology applications to stimulate real-world environments and create actual environments for experimentation, so that students can carry out authentic tasks as real workers would (Means, 1993).

Self-concept is also a very important factor among at risk students. All students need to feel good about themselves and their achievements. In order to help students value their own self-worth, teachers should attempt to treat all students with kindness, courtesy and especially respect--regardless of how the student treats the teacher (Raffini, 1993). It is easy

to be friendly and kind to those students who never give a teacher any trouble. But it is the students who tend to have or cause trouble that can actually benefit the most from a kind word from a teacher.

Promoting self-worth and motivation in students is not solely the responsibility of the educator. Family variables also influence motivation and commitment in school (Ames, 1989). Ames states, "Family attention to learning starts in infancy when parents teach their toddlers to walk and talk". As children grow up, parent involvement in learning will vary. Many parents continue to encourage their child to learn and consistently meet and talk with their child's teacher as they progress through school. However, some parents do not have time to be involved in their child's academic activities. This may cause students to feel as if their parents are not interested in whether they achieve in school or fail.

Methodology and Procedures

The population for this study was taken from a selected adult high school in upper east Tennessee. The school consisted of an enrollment of approximately forty-five (45) students during the 2001-2002 school year. The population was predominantly Caucasian, with a total of only two (2) minority students. The ethnic percentage of the population was ninety-eight percent (98%) Caucasian and two percent (2%) African American. This adult high school was coed and all students came from a middle to lower socioeconomic background. Only approximately three percent (3%) of the population qualified for special education services.

The sample for this study included fifteen (15) students who were actively seeking to pass the math portion of the Tennessee Competency Assessment Program (TCAP) exam. The sample consisted of nine (9) females and six (6) males. This sample made up both the control group and the experimental group. Age of the students ranged from seventeen (17) to twenty-three (23) years.

Data were collected for two (2) six-week periods of instruction. During the first six-week period, traditional strategies were used.

Motivational strategies of teaching were then implemented during the second six-week period.

A survey, developed by the experimenter, was administered to the sample at the beginning of the year and once more at the end of the year to determine any differences in responses concerning motivation. The survey was developed through the use of related literature, and its proposed function was to assess motivational factors related to learning high school mathematics. The survey consisted of thirty (30) questions, in which the odd numbered questions were given at the beginning of the year and the even numbered questions were given at the end of the year. The survey questions covered five (5) major categories relating to academic motivation: General Background in mathematics, Feelings about school and mathematics, Non-school influences on Motivation, Self-confidence and natural ability in mathematics, and Mathematics Content. The survey was in the form of a Likert scale with choices ranging from one (1) - always, to five (5) - never.

After the initial six-week period of traditional teaching was over, motivational strategies were implemented for the next six-week period to motivate the students. The motivational strategies consisted of computer-based instruction, cooperative learning, peer-tutoring, and enrichment worksheets relating math to the real world. Publisher-created test,

developed by the authors of the ninth-grade (9th) math textbook, and experimenter-made exams and quizzes were administered consistently throughout the study. Academic achievement was measured using points earned on tests and quizzes. Equivalent materials were used during both six-week periods. Exams and quizzes followed the same format for each period of instruction.

Procedures

Before the study was conducted, permission was obtained from the school system's adult education coordinator. After permission was granted, fifteen (15) students were selected for the sample. The selection was made based on previous TCAP scores in math. These fifteen (15) students were then enrolled in the TCAP preparation class offered by the adult high school. This sample served as both the control group and the experimental group.

The class received traditional instruction for the first six-week period. Lecturing, class discussion, and competitive teaching methods were included in this traditional instruction. Students were only briefly informed of the criteria expected during this first six-week period and the teacher used only the 9th grade math textbook for instruction. Exams were administered each week on Friday and an occasional pop-quiz was given and

included in the final grade. Students were not allowed to retake any exam or quiz unless they scored below seventy (70). Exams and quizzes were graded using the traditional 100-point scale.

The following six-week period, the class was taught using motivational strategies of instruction developed by the experimenter. During this six weeks, the students were taught using an interactive math computer program, which was designed to give immediate feedback and explanations, cooperative learning, peer tutoring, and enrichment work sheets relating math to the real world. Before this six-week period began, students were given a syllabus of assignments and deadlines. The syllabus was explained in detail and the students knew exactly what was expected of them. Each day, the teacher would use the first five (5) to ten (10) minutes of class ensuring that all students understood the day's assignments. The teacher monitored the students' progress as they worked on the computers, and cooperative groups. Encouraging words and praise were consistently given by the teacher as each student worked on an assignment. The teacher also tried to incorporate how each topic could relate to the everyday world. Additional enrichment worksheets were available as needed. The goals of these motivational strategies of instruction were to encourage a more relaxed

learning atmosphere in the classroom and increase student self-concept in math, therefore, increasing motivation. Exams administered during this six-week period were graded using an experimenter-developed grading scale.

After twelve weeks of instruction were completed, the students' grades were calculated for each of the six-week periods. The researcher did an analysis of the grades to determine which instructional strategies lead to higher scores.

Results

Two research questions were used to guide the analysis of the data. Each research question was followed by a research hypothesis. Data were analyzed at .05 level of significance.

Research Questions:

1. Is there a difference between academic achievement in math of students taught using traditional strategies of instruction and students taught using motivational strategies of instruction?

2. Is there a difference in attitude towards math before and after implementation of motivational strategies?

Research questions 1 and 2 were analyzed using a paired samples t-test. The results for research question 1 indicated a significant difference

in scores when the students were taught using traditional style and motivational strategies ($t(14) = 7.167$, $p < .05$). Results are displayed in Table 1. Similarly, research question 2 indicated a significant difference in attitudes towards math when students were taught using motivational strategies than when using traditional styles ($t(14) = 11.097$, $p < .05$). Results are displayed in Table 2.

Table 1

Paired Samples t-test for

Academic Scores

Test	M	SD	df	t-value	Sig.(2t)
Traditional	84.13	5.01	14	7.167	.001
Motivational	94.40	2.72	14	7.167	.001

Note: P < .05.

Table 2

Paired Samples t-test of

Student Attitudes towards Math

Test	M	SD	df	t-value	Sig. (2t)
Before Motivation	35.80	4.33	14	11.097	.001
After Motivation	46.40	1.72	14	11.097	.001

Note: P < .05.

Discussion

Academic Achievement

Research Questions 1 focused on whether there was a difference between academic achievement of students taught using traditional strategies and students taught using motivational strategies in math. When a comparison was made between math test scores of these students, the results indicated that a significant difference was found. An analysis of the test scores yielded a t-value of 7.167 ($p < .05$).

The results suggest that teachers should use more frequently a variety of teaching strategies in the classroom such as cooperative teaching, peer tutoring and interactive computer programs instead of solely relying on traditional strategies of teaching. The students taught using traditional strategies appeared bored because the responsibility of learning was directly on the teacher. When the students were taught using motivational strategies, they seemed more motivated because they were more directly involved in the learning process, thus yielding higher test scores. The students taught using traditional strategies also had very little interaction with each other. This lack of involvement and interaction affected their

retention of the subject matter; therefore, this group did not average as high scores as the experimental group.

Attitudes

When research question 2, is there a significant increase in motivation towards math of students taught using motivational strategies of instruction and students taught using traditional strategies of instruction, was analyzed, the results indicated that there was a significant increase (t = 11.097). The students who were taught using motivational teaching strategies interacted with each other, the teacher, and worked with an interactive computer program, which gave them daily feedback on their progress. This interaction had a positive effect on the students' attitudes toward learning mathematics. They did not seem as discouraged, felt less pressured, and seemed to find that learning mathematics was not as difficult as they originally believed. When the students were taught using traditional strategies, they did not seem to enjoy the learning process involved in their unit as much. A reason for this may be due to the lack of involvement that led to the lack of understanding of this subject matter. These results were consistent with Raffini's studies that showed that students are stimulated by teachers who are not always predictable or use limited instructional patterns (Raffini, 1993).

Conclusions

This study explored the differences of the effects between motivational teaching strategies and traditional teaching strategies in academic achievement and students' attitudes towards math in an adult high school setting. There were significant differences in the group when taught using motivational strategies and when using traditional strategies in both academic achievement and students' attitudes. Inferences can be made from the data analysis that motivational teaching strategies increase academic achievement and encourage students to have a more positive attitude towards learning mathematics.

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